

WHAT IS CLAIMED IS:

1. A lens device comprising:

variator lens means for performing a zooming  
5 operation;  
zoom operating means for operating said variator  
lens means;  
information output means for outputting operation  
information sent from said zoom operating means and for  
10 outputting zooming position information of said variator  
lens means;  
information input means for receiving control  
information, which is used for controlling said variator  
lens means, from an external device; and  
15 variator control means for controlling a zooming  
operation of said variator lens means according to the  
inputted control information.

2. The lens device according to claim 1, wherein the  
20 control information contains information on at least one  
of a direction and a speed given to said variator lens  
means.

3. The lens device according to claim 1, wherein said  
25 information output means outputs the operation  
information when said variator lens means is placed at a

tele end.

4. An imaging apparatus comprising:

imaging means for imaging an object and for  
5 outputting an image signal;  
information input means for receiving external zoom  
operating information and zoom position information to  
be supplied to external variator lens means;  
zoom operating means for receiving internal zoom  
10 operating information to be supplied to said external  
variator lens means; and  
information output means for generating and  
outputting optical zooming control information to be  
used for controlling a zooming operation of said  
15 external variator lens means according to the inputted  
external zoom operating information and the inputted  
zoom position information and the internal zoom  
operating information received from said zoom operating  
means.

20

5. The imaging apparatus according to claim 4, which  
further comprises:

electronic zooming means for performing electronic  
enlargement processing on an image represented by the  
25 image signal; and  
electronic zooming control means for controlling

said electronic zooming means according to the inputted external zoom operating information, the inputted zoom position information and the internal zoom operating information.

5

    6.    The imaging apparatus according to claim 4, wherein the external zoom operating information and the internal zoom operating information contain information on at least one of a direction and a speed given to said 10 external variator lens means.

    7.    The imaging apparatus according to claim 5, wherein said electronic zooming means performs the enlargement processing when the zoom position information indicates 15 a tele end.

    8.    The imaging apparatus according to claim 4, wherein said information output means gives the external zoom operating information precedence over the internal zoom 20 operating information when the external zoom operating information indicates that a zooming operation is being performed.

    9.    The imaging apparatus according to claim 5, wherein 25 said electronic zooming control means gives the external zoom operating information precedence over the internal

zoom operating information when the external zoom operating information indicates that a zooming operation is being performed.

- 5 10. An imaging system comprising:
  - a lens device having:
    - a variator lens means for performing a zooming operation;
    - lens-side zoom operating means for operating said variator lens means;
    - lens-side information output means for outputting lens-side zoom operating information and zoom position information on a zoom position of said variator lens means, which are received from said lens-side zoom operating means;
    - lens-side information input means for receiving optical zoom control information to be used for controlling said variator lens means; and
    - variator control means for controlling a zooming operation of said variator lens means according to the received control information, and
  - an imaging apparatus having:
    - imaging means for imaging an object and for outputting an image signal;
    - camera-body-side information input means for receiving the lens-side zoom operating information and
- 20 25

zoom position information from said lens-side information output means;

camera-body-side zoom operating means for receiving camera-body-side zoom operating information to be 5 supplied to said variator lens means; and

camera-body-side information output means for generating optical zooming control information to be used to control a zooming operation of said variator lens means, according to the received lens-side zoom 10 operating information and the received zoom position information and the camera-body-side zoom operating information and for outputting the optical zooming control information to said lens-side information input means.

15

11. The imaging system according to claim 10, wherein said imaging apparatus further comprises:

electronic zooming means for performing electronic enlargement processing on an image represented by the 20 image signal; and

electronic zooming control means for controlling said electronic zooming means according to the lens-side zoom operating information, the zoom position information and the camera-body-side zoom operating 25 information.

12. The imaging system according to claim 10, wherein  
the optical zooming control information contains  
information on at least one of a direction and a speed  
given to said variator lens means.

5

13. The imaging system according to claim 10, wherein  
said lens-side information output means outputs the  
lens-side zoom operating information when said variator  
lens means is placed at a tele end.

10

14. The imaging system according to claim 11, wherein  
said electronic zooming control means performs the  
enlargement processing when the zoom position  
information indicates a tele end.

15

15. The imaging system according to claim 10, wherein  
said camera-body-side information output means gives the  
lens-side zoom operating information precedence over the  
camera-body-side zoom operating information when the  
20 lens-side zoom operating information indicates that a  
zooming operation is being performed.

16. The imaging system according to claim 11, wherein  
said electronic zooming control means gives the lens-  
25 side zoom operating information precedence over the  
camera-body-side zoom operating information when the

lens-side zoom operating information indicates that a zooming operation is being performed.

17. The imaging system according to claim 10, wherein a  
5 cycle of transmission and reception of information  
between said lens-side information output means and said  
camera-body-side information input means and between  
said lens-side information input means and said camera-  
body-side information output means is nearly equal to a  
10 cycle of a standard television vertical synchronization  
signal.

18. A computer readable storage medium for storing a  
program causing a computer to execute the steps of:  
15       outputting operation information, which is obtained  
when a variator lens is operated, and zoom position  
information which represents a zoom position of said  
variator lens;  
             inputting control information, which is used for  
20 controlling said variator lens, from an external device;  
and  
             controlling said variator lens according to the  
inputted control information.  
25 19. A computer readable storage medium for storing a  
program causing a computer to execute the steps of:

imaging an object and outputting an image signal;  
receiving external zoom operating information and  
zoom position information to be supplied to an external  
variator lens;

5 receiving internal zoom operating information to be  
supplied to said external variator lens; and  
generating and outputting optical zooming control  
information to be used for controlling a zooming  
operation of said external variator lens according to  
10 the inputted external zoom operating information and the  
inputted zoom position information and the internal zoom  
operating information.

20. A lens device comprising:

15 variator lens means for performing a zooming  
operation;  
zoom operating means for operating said variator  
lens means;  
information output means for outputting first zoom  
20 operating information, which is received from said zoom  
operating means, and zoom position information  
representing a zoom position of said variator lens  
means;

information input means for receiving second zoom  
25 operating information and zooming inhibition information  
from an external device; and

variator control means for controlling a zooming operation of said variator lens means according to the first zoom operating information, the inputted second zoom operating information and the inputted zooming 5 inhibition information.

21. The lens device according to claim 20, wherein the first zoom operating information and the second zoom operating information contain information on at least 10 one of a direction and a speed given to said variator lens means.

22. The lens device according to claim 20, wherein said information output means outputs the first zoom 15 operating information when said variator lens means is placed at a tele end.

23. The lens device according to claim 20, wherein said variator control means gives the first zoom operating 20 information precedence over the second zoom operating information when the first zoom operating information indicates that a zooming operation is being performed.

24. A camera apparatus comprising:  
25        imaging means for imaging an object and for outputting an image signal;

information input means for receiving first zoom operating information and zoom position information to be supplied to external variator lens means;

zoom operating means for receiving second zoom operating information to be supplied to said external variator lens means;

information output means for outputting the second zooming control information and optical zooming inhibition information to be used for inhibiting a zooming operation of said external variator lens means;

electronic zooming means for performing electronic enlargement processing on an image represented by the image signal; and

electronic zooming control means for controlling said electronic zooming means according to the first zoom operating information, the zoom position information and the second zoom operating information.

25. The camera apparatus according to claim 24, wherein the first zoom operating information and the second zoom operating information contain information on at least one of a direction and a speed given to said external variator lens means.

25 26. The camera apparatus according to claim 24, wherein said electronic zooming means performs the enlargement

processing and said information output means outputs the optical zooming inhibition information when the first zoom operating information and the second zoom operating information indicate a tele end.

5

27. The camera apparatus according to claim 24, wherein said electronic zooming control means and said information output means give the first zoom operating information precedence over the second zoom operating information when the first zoom operating information indicates that a zooming operation is being performed.

10 28. A camera system comprising:  
a lens device having:  
15 a variator lens means for performing a  
zooming operation;  
lens-side zoom operating means for operating said  
variator lens means;  
lens-side information output means for outputting  
20 first zoom operating information, which is received from  
said lens-side zoom operating means, and zoom position  
information on a zoom position of said variator lens  
means;  
lens-side information input means for receiving  
25 second zoom operating information and zooming inhibition  
information from an external device; and

variator control means for controlling a zooming operation of said variator lens means according to the received second zoom operating information and the zooming inhibition information and the first zoom 5 operating information, and an imaging apparatus having:

imaging means for imaging an object and for outputting an image signal;

camera-body-side information input means for 10 receiving the first zoom operating information and zoom position information from said lens-side information output means;

camera-body-side zoom operating means for receiving the second zoom operating information to be supplied to 15 said variator lens means; and

camera-body-side information output means for outputting said lens-side information input means the second zoom operating information and the optical zooming inhibition which is used for inhibiting said 20 variator lens means from performing a zooming operation;

electronic zooming means for performing electronic enlargement processing on an image represented by the image signal; and

electronic zooming control means for controlling 25 said electronic zooming means according to the first zoom operating information, the zoom position

information and the second zoom operating information.

29. The camera system according to claim 28, wherein  
the first zoom operating information and the second zoom  
5 operating information contain information on at least  
one of a direction and a speed given to said external  
variator lens means.

30. The camera system according to claim 28, wherein  
10 said lens-side information output means outputs the  
first zoom operating information said electronic zooming  
control means performs the enlargement processing when  
said variator lens means is placed at a tele end.

15 31. The camera system according to claim 28, wherein  
said camera-body-side information output means and said  
electronic zooming means give the first zoom operating  
information precedence over the second zoom operating  
information when the first zoom operating information  
20 indicates that a zooming operation is being performed.

32. The camera system according to claim 28, wherein a  
cycle of transmission and reception of information  
between said lens-side information output means and said  
25 camera-body-side information input means and between  
said lens-side information input means and said camera-

body-side information output means is nearly equal to a cycle of a standard television vertical synchronization signal.

5 33. A computer readable storage medium for storing a program causing a computer to execute the steps of:

      outputting first zoom operating information, which is obtained when a variator lens is operated, and zoom position information which represents a zoom position of  
10 said variator lens;

      inputting second zoom operating information and zooming inhibition information, which are received from an external device; and

      controlling said variator lens according to the  
15 inputted second zoom operating information, the inputted zooming inhibition information and the first zoom operating information.

34. A computer readable storage medium for storing a  
20 program causing a computer to execute the steps of:

      imaging an object and outputting an image signal;  
      receiving first zoom operating information and zoom position information to be supplied to an external variator lens;  
25       receiving second zoom operating information to be supplied to said external variator lens;

outputting the second zooming control information and optical zooming inhibition information to be used for inhibiting said external variator lens from performing a zooming operation; and

5 performing electronic zooming for electronically enlarging an image represented by the image signal according to the first zoom operating information and the second zoom operating information and the zoom position information.

10

35. A lens control system comprising:

a first device having optical variator means for optically changing a magnification of an image;

a second device having electronic variator means for electronically enlarging an image by signal processing; and

first and second variator operating members respectively provided in said first and second devices, wherein, when said optical variator means is operated, said optical variator means is controlled in said first device according to information for operating said first and second variator operating members, wherein, when said electronic variator means is operated, said electronic variator means is controlled in said second device according to information for operating said first and second variator operating members, and

wherein, during said electronic variator means is operated, said first device inhibits said optical variator means from operating.

5 36. A camera system comprising:

a lens device having an optical variator lens for optically changing a magnification of an image;

10 a camera device having electronic variator means for electronically enlarging an image by signal processing;

a lens-device-side variator operating member; and a camera-device-side variator operating member,

15 wherein, when said optical variator lens is operated, said optical variator lens is controlled in said lens device according to information for operating said lens-device-side and camera-device-side variator operating members,

20 wherein, when said electronic variator means is operated, said electronic variator means is controlled in said camera device according to information for operating said lens-device-side and camera-device-side variator operating members, and

25 wherein, during said electronic variator means is operated, a signal causing said lens device to inhibit said optical variator lens from operating is transmitted to said lens device.

37. A camera device for use in a camera system having a lens device having an optical variator lens for optically changing a magnification of an image, a lens-device-side variator operating member and a camera-device-side variator operating member, said camera device comprising:

electronic variator means for electronically enlarging an image by signal processing,

10 wherein, when said optical variator lens is operated, said optical variator lens is controlled in said lens device according to information for operating said lens-device-side and camera-device-side variator operating members,

15 wherein, when said electronic variator means is operated, said electronic variator means is controlled in said camera device according to information for operating said lens-device-side and camera-device-side variator operating members, and

20 wherein, during said electronic variator means is operated, a signal causing said lens device to inhibit said optical variator lens from operating is transmitted to said lens device.

25 38. A camera device for use in a camera system having a camera device having electronic variator means for

electronically enlarging an image by signal processing, a lens-device-side variator operating member, and a camera-device-side variator operating member, said a lens device comprising:

5       an optical variator lens for optically changing a magnification of an image,

      wherein, when said optical variator lens is operated, said optical variator lens is controlled in said lens device according to information for operating 10    said lens-device-side and camera-device-side variator operating members,

      wherein, when said electronic variator means is operated, said electronic variator means is controlled in said camera device according to information for 15    operating said lens-device-side and camera-device-side variator operating members, and

      wherein, during said electronic variator means is operated, a signal causing said lens device to inhibit said optical variator lens from operating is transmitted 20    to said lens device.

39. A lens device comprising:

      variator lens means for performing a zooming operation;

25       control means for controlling the zooming operation of said variator lens means; and

signal output means for outputting an electronic zooming enabling signal and an electronic zooming preparation signal for giving advance notice of the electric zooming enabling signal, during the zooming 5 operation.

40. The lens device according to claim 39, wherein said signal output means outputs the electronic zooming enabling signal when said variator lens means is placed 10 at a tele end.

41. The lens device according to claim 39, wherein said signal output means outputs the electronic zooming preparation signal when said variator lens means reaches 15 the tele end within a predetermined time if said variator lens means continues performing a current zooming operation.

42. The lens device according to claim 39, wherein said 20 signal output means outputs the electronic zooming preparation signal when said variator lens means reaches the tele end within a predetermined time, which is a predetermined integral multiple of a cycle of a standard television signal, if said variator lens means continues 25 performing a current zooming operation.

43. An imaging apparatus comprising:

imaging means for imaging an object and for

outputting an image signal;

electronic zooming means for electronically

5 enlarging an image represented by the image signal;

signal input means for receiving an electronic

zooming preparation permission signal and an electronic

zooming enabling signal; and

control means for enabling control of said

10 electronic zooming means when each of the electronic

zooming preparation permission signal and the electronic

zooming enabling signal is received.

44. The imaging apparatus according to claim 43,

15 wherein said signal input means receives position

information of a zoom lens.

45. The imaging apparatus according to claim 43,

wherein said control means starts controlling said

20 electronic zooming means when the electronic zooming

preparation permission signal is received.

46. An imaging system comprising:

a lens device having:

25 a variator lens means for performing a zooming

operation;

first control means for controlling the zooming operation of said variator lens means; and signal output means for outputting an electronic zooming enabling signal and an electronic zooming 5 preparation permission signal which gives advance notice of the electric zooming enabling signal, during the zooming operation, and an imaging apparatus having: imaging means for imaging an object and for 10 outputting an image signal; electronic zooming means for performing electronic enlargement processing on an image represented by the image signal; signal input means for receiving an electronic 15 zooming preparation permission signal and an electronic zooming enabling signal; and second control means for enabling control of said electronic zooming means when each of the electronic zooming preparation permission signal and the electronic 20 zooming enabling signal is received.

47. The imaging system according to claim 46, wherein said signal output means outputs the electronic zooming enabling signal when said variator lens means is placed at a tele end.

48. The imaging system according to claim 46, wherein,  
during said variator lens means performs the zooming  
operation, said signal output means outputs the  
electronic zooming preparation signal if said variator  
5 lens means reaches the tele end within a predetermined  
time when said variator lens means continues performing  
the zooming operation.

49. The imaging system according to claim 46, wherein  
10 said signal output means outputs the electronic zooming  
preparation signal when said variator lens means reaches  
the tele end within a predetermined time, which is a  
predetermined integral multiple of a cycle of a standard  
television signal, if said variator lens means continues  
15 performing a current zooming operation.

50. The imaging system according to claim 46, wherein  
said second control means starts controlling said  
electronic zooming means when the electronic zooming  
20 preparation permission signal is received.

51. The imaging system according to claim 46, wherein  
said signal output means and said signal input means  
transmit and receive the electronic zooming preparation  
25 permission signal and the electronic zooming enabling  
signal in synchronization with a standard television

vertical synchronization signal.

52. A computer readable storage medium for storing a program causing a computer to execute the steps of:

5       controlling a zooming operation performed by a variator lens; and

      outputting an electronic zooming enabling signal and an electronic zooming preparation permission signal which gives advance notice of the electric zooming

10     enabling signal, during the zooming operation.

53. A computer readable storage medium for storing a program causing a computer to execute the steps of:

      imaging an object and outputting an image signal;

15     performing electronic zooming for electronically enlarging an image represented by the image signal;

      receiving an electronic zooming preparation permission signal and an electronic zooming enabling signal; and

20     enabling the electronic zooming when each of the electronic zooming preparation permission signal and the electronic zooming enabling signal is received.

54. An imaging apparatus comprising:

25     imaging means;

      electronic zooming means for enlarging an image

taken by said imaging means;

zoom input means for receiving zoom operating information;

lens information input means for receiving first  
5 zoom information, which indicates presence or absence of an optical zooming mechanism in an external lens means, and second zoom information which indicates presence or absence of an optical zooming mechanism, which does not operate in response to a control signal received from an  
10 external device, in said external lens means;

control output means for outputting an optical zooming control signal which instructs said external lens means to perform a zooming operation; and

control means for controlling said optical zooming  
15 mechanism of said external lens means through said electronic zooming means and said lens control output means according to the zoom operating information inputted to said zoom input means in such a manner as to be able to be driven, in a case that the first zoom  
20 information indicates the presence of said optical zooming mechanism and that the second zoom information indicates the absence of said optical zooming mechanism, and for controlling said electronic zooming means in such a manner as to be able to be driven, in a case that  
25 the first zoom information indicates the absence of said optical zooming mechanism, and for controlling said

electronic zooming means in such a manner as not to be driven, in a case that the second zoom information indicates the presence of said optical zooming mechanism.

5 55. The imaging apparatus according to claim 54, wherein, when said external lens means is included in a specific lens group containing a lens that causes the second zoom information to indicate the presence of said optical zooming mechanism, the second zooming  
10 information on said external lens means is permitted to indicate the presence of said optical zooming mechanism.

56. The imaging apparatus according to claim 54, wherein information represented by the optical zooming  
15 control signal includes at least one kind of information representing a zooming direction to be given to said external lens means, information representing a zooming speed to be given thereto, and information representing both a zooming direction and a zooming speed to be given  
20 thereto.

57. An imaging apparatus comprising:  
imaging means;  
electronic zooming means for enlarging an image  
25 taken by said imaging means;  
zoom input means for receiving zoom operating

information;

lens information input means for receiving zoom information, which indicates presence or absence of an optical zooming mechanism in an external lens means, and

5 specific lens group information which indicates whether said external lens means belongs to a specific lens group;

control output means for outputting an optical zooming control signal which instructs said external

10 lens means to perform a zooming operation; and

control means for controlling said optical zooming mechanism of said external lens means through said electronic zooming means and said lens control output means according to the zoom operating information

15 inputted to said zoom input means in such a manner as to be able to be driven, in a case where the zoom information indicates the presence of said optical zooming mechanism and where the specific lens group information indicates that said external lens means does

20 not belong to said specific lens group, and for controlling said electronic zooming means in such a manner as to be able to be driven, in a case where the zoom information indicates the absence of said optical zooming mechanism, and for controlling said electronic

25 zooming means in such a manner as not to be driven, in a case where the specific lens group information indicates

that said external lens means belongs to said specific lens group.

58. The imaging apparatus according to claim 57,  
5 wherein, when said specific lens group contains a lens having an optical mechanism that does not operate in response to a control signal received from an external device.

10 59. The imaging apparatus according to claim 57, wherein information represented by the optical zooming control signal includes at least one kind of information representing a zooming direction to be given to said external lens means, information representing a zooming speed to be given thereto, and information representing both a zooming direction and a zooming speed to be given thereto.

15